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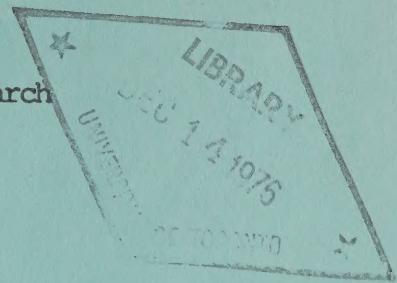
ONTARIO COUNCIL ON UNIVERSITY AFFAIRS

OPEN MEETING WITH MCMASTER UNIVERSITY

NOVEMBER 22, 1974

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ONTARIO COUNCIL ON UNIVERSITY AFFAIRS

MINUTES

4-0052 MEETING

OPEN MEETING WITH **McMASTER UNIVERSITY**

LOCATION

McMaster University
Hamilton, Ontario

DATE AND TIME

November 22, 1974
2:00 p. m.

4-0053 ATTENDANCE

OCUA MEMBERS

J. S. Dupré

W. E. Bagnall

L. Good

M. A. B. Bush

W. A. Goyan

J. J. Deutsch

A. L. McCallion

A. D'Iorio

M. F. Orange

P. D. Fleck

R. P. Riggin

J. D. Fisher

H. H. Walker

R. Gerstein

J. R. Yarnell

T. Giesbrecht

OCUA STAFF

J. P. Venton
Executive Secretary

N. E. Simmons
Associate Secretary

MCU (Observer)

B. A. Wilson
Assistant Deputy Minister

COU (Observer)

B. L. Hansen
Director of Research

McMASTER UNIVERSITY DELEGATION

Dr. A. N. Bourns
President

Mr. M. Bentley
Graduate Student Senator

Prof. A. Berland
Dean, Faculty of Humanities

Mr. J. P. Evans
Assistant Vice-President
Academic Services

Mr. D. M. Hedden
Vice-President, Administration

Dr. F. E. Jones
President
McMaster Faculty Association

Dr. L. J. King
Dean of Graduate Studies

Mr. J. A. MacFarlane
Assistant Vice-President Administration

Dr. D. R. McCalla
Dean, Faculty of Science

Dr. P. L. Newbigging
Academic Colleague to COU

Mr. F. H. Sherman
Chairman
Board of Governors

Dr. W. J. Walsh
Associate Dean
Faculty of Health Sciences

Dr. H. C. Dixon
Vice-Chairman, Board of Governors

Mr. F. M. Fell
Chairman, Finance Committee
Board of Governors

Dr. B. A. W. Jackson
Chairman, Senate Committee on
Academic Policy

Dr. R. C. Joyner
Dean, Faculty of Business

Dr. A. A. Lee
Vice-President, Academic

Prof. W. J. McCallion
Dean of Adult Education

Dr. R. C. McIvor
Acting Dean
Faculty of Social Sciences

Dr. L. W. Shemilt
Faculty of Engineering

Mr. H. Steubing
President
McMaster Students' Union

4-0054 OPENING REMARKS

The President and other members of McMaster's delegation opened the hearing by reviewing and highlighting the University's brief which had been previously distributed. A copy of the President's remarks and a supplementary submission distributed at the meeting are attached as Appendix "A" to these Minutes. In addition to matters dealt with in depth in the brief and supplement thereto, subsequent discussion focused on the following:

4-0055 EFFECTS OF FISCAL STRINGENCY ON RESEARCH

The delegation and Council discussed at length the consequences of fiscal stringency on McMaster's research establishment. At the Chairman's request the President agreed to prepare a summary and elaboration of the points raised which is attached to these Minutes as Appendix "B".

4-0056 FINANCIAL PROBLEMS

(i) Salaries and Staffing

The delegation discussed the current academic staffing situation at McMaster and emphasized that difficulties were being encountered both in attracting and retaining competent faculty. It was stressed that, reluctantly, faculty interest in moving toward collective bargaining was being stimulated by continued loss of purchasing power. The long term implications of this situation combined with other factors such as research funding cutbacks, growth in class sizes, and teaching-load increases, were forecast to have serious long-term implications for faculty potential, quality and output, and the quality of the educational experience offered to students. The growing gap between university support staff salaries and the local market was also described in detail. Areas of emphasis included the situation in the Health Sciences complex where University personnel worked side by side with hospital employees whose salaries had benefited from

recent settlements and the non-academic contingent who were paid from research grants and other non-university sources. The latter group had always received supplements from University operating funds to correct salary anomalies, but the delegation indicated that beginning in 1975-76 this practice would have to be discontinued due to financial stringencies. Further cutbacks in support staff complements were considered a move toward inappropriate resource utilization and it was felt that should prevailing circumstances continue it was expected that non-academic employees would also be seeking collective bargaining status.

(ii) Pensions

The long range consequences of "final earnings" pension plans in a flat age distribution situation were discussed and the McMaster delegation spoke in favour of the establishment of a province-wide pension scheme tied to an index for protection against inflation. Such a scheme, it was felt, would enhance mobility between universities, thus benefiting the individual and the system. In addition, the delegation supported the idea that any proposal for future University financing should separate pension costs from other operating expenses.

(iii) The Future

The delegation indicated that in its view the Government through decreasing the real value of the BIU over recent years had indicated that university importance had declined. It was stressed that in order to effect a transition universities would require a period of a few years and, given the need for extensive basic readjustments, it was felt that the Government should set up temporary financial arrangements in the interim.

4-0057 CAPITAL FINANCING

The delegation reviewed the urgent capital needs which were detailed in the University's brief and gave clear priority to the need for cyclic renewal as opposed to new building funds.

4-0058 EXTENSION TEACHING AND COMMUNITY SERVICE

In a discussion of part-time and extension programmes it emerged that in the past three years the amount of extension teaching done on straight-load, as opposed to overload had increased from 16% to 44%. The vulnerability of extended programmes and community service (especially in the Social Sciences) in this setting was stressed.

4-0059 GRADUATE STUDIES

In a far-ranging discussion of graduate studies the following issues were identified: the current ceiling on graduate student financial assistance from operating funds which had caused increased costs to non-operating and research sources; the current level of OGS support available which it was suggested should be increased in the neighbourhood of 25% - 30%; and the lack of interest among prospective graduate students in Ontario graduate schools. Graduate students receiving University stipends were generally required to assist in undergraduate programmes as lab assistants and tutorial leaders. The minimum level of support for a master's student was reported to be \$4,000 with doctoral students receiving between \$4,000 and \$5,000.

A graduate student member of the delegation stressed that the number and quality of graduate students could be expected to drop if the University's opportunities for and emphasis on research declined. Graduate student concerns included increased class sizes and the University's inability to provide sufficient graduate student support in an inflationary situation.

4-0060 FACULTY ASSOCIATION VIEWPOINT

A representative of the University's Faculty Association explained to Council that although the Association had not been involved in preparation of the brief it lent support to arguments made therein especially those concerning the maintenance of strong research and scholarly initiatives and the description of current and projected financial difficulties.

4-0061 STUDENT CONCERNs

Student representatives in their presentation indicated areas being adversely affected by the current financial situation including: student:teacher ratios; residences; counselling services; athletics; and social services. The students urged that the Government develop and communicate clear policy directions for the University system based on public demand. It was also felt that the Government's policy on accessibility was in jeopardy under current financial conditions which were beginning to limit the quality and diversity of programme offerings. It was felt strongly that without opportunities for scholarly work, good teachers would not develop to their potential.

.....
N. E. Simmons

Associate Secretary

J. S. Dupre
Chairman

PRESENTATION TO THE ONTARIO COUNCIL ON UNIVERSITY AFFAIRS

November 22, 1974

I wish first to express to you, Mr. Chairman, and the members of the Ontario Council for University Affairs our appreciation for having this opportunity to present to you a picture of this University, its aims and objectives, its strengths and its weaknesses, its particular role, as we see it, in the university system of this Province, and, of course, its needs if it is successfully to fulfil this role.

I do believe that I should begin this presentation by apologizing for the length of our written submission. But we believed that it is the Council's wish it obtain the fullest possible perspective of our university and this we have attempted to provide. We may have been too zealous but the exercise has been extremely valuable for us and, I trust, has come close to meeting your objectives.

Because of the comprehensiveness of the 'educational' section of our written submission I believe that our formal presentation this afternoon should be fairly brief and should concentrate primarily on the financial problems of the University. There are two or three points concerning the nature of this University on which I would like to expand.

The first of these is that McMaster over the past twenty-five years has given particular emphasis to graduate study and scholarship; at the same time, we have made every effort to ensure that our work in these areas serves to strengthen the quality of our undergraduate programs rather than to detract from them.

It may be of interest to note that McMaster initiated on a major scale doctoral work in 1950 in the physical sciences and soon after in biology and geology, (almost a full decade before Queens or Western, Alberta or British Columbia). Our Engineering Faculty which was formed in 1958 was established on a strong scientific base and developed graduate work in parallel with its undergraduate programs. In fact, the first degree to be granted in Engineering was at the graduate level. Graduate study developed more slowly in the Arts disciplines for reasons that were as much related to national

as to institutional policies. As we entered the 1970's, however, we had achieved exceptional strength in a number of Arts disciplines, notably Classics, Religion, English, Economics and Urban Geography and others moving forward strongly.

I am persuaded it would be useful if I were to elaborate further on the special role which this University sees for itself in graduate work and research in the Ontario university system, on our success in fulfilling this role and on the particular problems in relation to operating budgets, which this emphasis inevitably creates.

As you know, Mr. Chairman, the major part of research funding, exclusive of faculty salaries and overhead, in Science and Engineering is provided by the National Research Council through the peer system of review of applications from individual faculty. An important measure of quality is the level of research support from this agency. It, therefore, is of interest to note that both the success ratio (grants/applications) and the average value of grant is the highest in Canada. In 1973-74 the average National Research Council grant at McMaster was \$11,670; the next highest was Toronto at \$10,913 and all others were below the \$10,000 figure. Despite our relatively small size, our total National Research Council operating grant support ranks six in the country. In the other National Research Council grant program, that of major scientific programs funded through development grants and major installations,

McMaster received, during the period 1966 to 1973, a level of funding which was 50% higher than any other University in Canada.

I hasten to add, Mr. Chairman, that as gratifying as this is, this level of research activity creates its own special problems, since as you know, these grants relate only to the direct cost of the work. The indirect costs, including salaries of the principle investigators, must be covered from university operating funds.

The quality and level of research in our Faculty of Health Sciences is equally impressive bearing in mind the programs are still very much in a build-up stage. The success rate of our new applicants to the Medical Research Council is 80% compared to an average of 26% for all Canadian medical schools. On a per faculty basis McMaster ranks third to Toronto and McGill in the total amount of research funding.

I have placed before you a table which shows the per cent of the total non-capital budget for the Ontario Universities in 1973-74 which was for sponsored research. (Sponsored research expenses correspond to total research funding provided by agencies other than the Ministry of Colleges and Universities). You will note that McMaster heads the list with 20.3% of its expenses belonging to this category. This is to be compared to Toronto at 15.9%, Western at 13.2% and Queens at 10.4%.

It is important to appreciate the magnitude of the costs associated with this level of research activity which must be covered from the regular

operating funds of the University. (Column I in the Table). Indeed, a recent cost analysis has shown that, for every dollar we receive under the category of sponsored research to cover the direct costs of costs of this activity, the University provides an additional ninety cents to pay for the indirect costs.

We, at McMaster, believe that it is extremely important in the Ontario university system to have a diversity of universities with a diversity of roles. We believe that we are fulfilling the role we have set for ourselves very well indeed and that it is important to Ontario and to Canada that McMaster maintain this emphasis in our activities. In light of the present financial situation and, particularly, the announcement of the level of support for 1975-76, we are being forced to ask whether it is the Ontario government's wish that we abandon this role and proceed to dismantle much that we have set in place during the past two decades. At any time, outstanding people are very mobile and the prospects of a more suitable environment for scholarly activity outside of Ontario is becoming increasingly apparent.

This raises the difficult problem of research funding, in general, to which we made brief reference in our submission. I would like again to emphasize our total agreement with the statement of the Commission on Post Secondary Education that no deterministic relationship

exists between student enrolment in a particular discipline and society's need for new knowledge in this field. Consequently, a system of funding the total costs of research must be put in place in the very near future, presumably through federal-provincial government agreement.

A well established commitment to which we have been giving increasing emphasis has been our community involvement in the broadest sense of the term. As a prime example, our part-time degree studies program continues to grow. In fact, I learned just yesterday that the registration in our winter evening program this year is at least 20% higher than it was last year. Particularly successful has been our growing net-work of part-time education satellites which include our Downtown Centre and programs in Burlington, Oakville and Grimsby. Next January, in cooperation with Mohawk College we shall begin to offer work in Hagersville in what, I believe, will be a precursor to an active involvement in the Nanticoke development.

One of our most significant areas of community involvement, of course, is in health care and I have asked Dr. Walsh to speak on this later in our presentation. Other community engagements includes our new work-study Master of Business Administration program, the involvement of our Commerce students in assisting small business, and the work of the School of Social Work all of which have served in the last few years to establish a very effective working relationship with a broad cross

section of the community. Currently, we are engaged in discussions with senior labor union officials concerning the kinds of programs the University might offer to meet the special needs of persons assuming leadership roles in the labour union movement. Dean Joyner may wish to amplify on this.

I must say that it has been highly gratifying to me to observe the very great pride that the citizens of this Region take in their University. Our community relations have never been better and, within our means, we shall continue to assign high priority to this area of public responsibility.

I would now like to turn to a consideration of our financial problems, first for 1974-75; and then, in the light of the Minister's recent announcement, to the following year. We have been guided by your suggestion, Mr. Chairman, and have tabled today three supplementary pages which I hope set out the position in a reasonably clear form.

Before leading you through this I should point out that during the summer and early fall we have been faced with a very serious problem arising from the large salary settlements in the hospital area. When these were applied to the support staff in MUMC (McMaster University Hospital), we had a situation in which persons doing the same work, in the same building, often in the same laboratory or office and with the

same supervisor were receiving salaries which differed, on the average, by as much as 26%.

About a month ago we awarded interim salary increases of \$300 per annum retroactive to July 1, to all University employees having salaries up to \$10,000. This brought our expenses to \$41,566,000. We were hopeful that the universities might receive a supplementary grant that would help us close the salary gap which, as the second line shows, would require an additional \$1,429,000. If such salary adjustments were to be made our deficit for the year becomes \$2,676,000. During the last several weeks we have identified net budget reductions of \$650,000 (I say net since some costs, for example, fuel have increased tremendously). With these savings, our deficit for the year becomes \$2,026,000 against which we have an accumulated surplus of \$1,600,000. In view of what we now see facing us in 1975-76, it is improbable that we can make anything like these salary adjustments.

On pages two and three, you will find a budget model which gives an insight into the dimensions of our problem. Our expense base, taken from the previous page, is \$42,345,000. Item 1, is the May/June 1975 cost of the July 1, 1974 salary increases; Item 2, the additional costs in 1975-76 of placing on a twelve months basis the 1974-75 salary adjustments for support staff shown on page 1. Item 2, is the cost of salary increases, effective July 1, 1975, for all employees of the University. These have been

set levels that bear a reasonable relationship to what is happening in the community; in all of these items it is assumed that there has been no change in staff numbers. Line 4, sets in place an increase in graduate student support levels and lines 5, 6 and 7 allow for inflation in all non-salary items of expenditure. Finally, the model assumes that one-quarter of the income resulting from growth in numbers of students is used for the purpose of providing additional resources to accommodate these additional students.

On page 3, we place against these expenses our non-formula and formula income, assuming in the case of the latter, a BIU value of \$2,100,000. The potential deficit for the year on the basis of this model is \$4,930,000.

Of course, we cannot have a deficit of this magnitude but our ability to make substantial reductions without doing serious harm to our work is extremely limited. Undoubtedly, we shall be unable to provide any net new resources for our increased enrolment. How serious this is can be appreciated only when it is recalled that we have this year a 45% increase in first year Science an area of severe understaffing at the present time. A 10 per cent reduction in support staff would save us only \$1.5 million; and the greater

part of this would have to be in the non-academic area which already has taken the brunt of cuts in previous year. We undoubtedly will have to reduce drastically our expenditures in the non-salary area. To allow nothing for inflation, would also save us close to 1.5 million but already the base is too small particularly in library and scientific equipment. To illustrate this point, our total expenditure for equipment in science and engineering this current years is \$225,000, which is barely enough to cover depreciation in one department, Chemistry.

We might give much lower salary increases but this could likely lead to unionization of faculty as well as support staff with all that this would entail in relation to a change in the nature of the University. Furthermore, quite aside from the injustice of such an action, we would lose many of our best people. As you know the opportunities for highly remunerative employment in government and industry are very great for faculty in engineering, business, economics and statistics. As long as we can provide a stimulating environment for teaching and research then many, perhaps most, faculty will be prepared to make a substantial financial sacrifice. But if that environment goes as well, then our hold on good people will not be very great.

Finally, I would like to present the University's position with respect to the allocation of the announced government grant of \$553 million for 1975-76. Not surprisingly, in view of our 6% increase in

the number of BIU's we very strongly favour the present formula allocation. The other alternatives which have been identified would result in a substantially lower income for this University. But quite aside from the effect on McMaster, I believe that it would be quite wrong to introduce in a retroactive way fundamental changes in the allocation method. We are within five months of the new financial year and we have been planning since October 1, on receiving income associated with 1200 new BIU's.

There is a further aspect to this matter which should be considered. It is not at all clear that for us, at least, the costs associated with growth are very much less than with base enrolment. This is because our growth is primarily in Science, a Faculty in which we are already critically understaffed. To accommodate the 45% increase in Year II in Science, for example, we shall need to create new lecture and laboratory sections the costs of which per student will not be greatly different from what we experience at present. In our view, a most careful analysis of the matter is required before the concept of a split BIU value can be introduced.

The one additional matter on which I had intended to speak concerns pensions. As with other universities we are experiencing serious problems of funding, we are concerned about the restrictions on portability and we recognize the urgent need for some kind of indexing provision. I understand that Dr. Jones, President of the Faculty Association, intends to speak on these matters; therefore, at this point, I would simply refer you to the statement which has been distributed under the heading "Status of McMaster Pension Fund".

PERCENTAGE ANALYSIS OF TOTAL DEATHS BY TYPE OF HOSPITAL AND UNIVERSITY ACTUAL AND THREE-YEARLY FROM APRIL 30, 1974

SCHEMATIC 2
TOTAL EXPENSE: 1000000

INVESTMENT CATEGORIES	INVESTMENT FUND					TOTAL INVESTMENT CAPITAL	TOTAL FUND
	INVESTING ENTERPRISES INVESTMENT	INDUSTRIAL INVESTMENT	INVESTMENT IN INVESTMENT	INVESTMENT IN INVESTMENT	INVESTMENT IN INVESTMENT		
AGRICULTURE	67.6	7.9	2.2	1.1	0.9	100.0	100.0
MANUFACTURE	61.3	9.9	7.5	1.2	0.3	100.0	90.0
INDUSTRIAL EQUIPMENT	74.9	13.4	9.7	1.9	0.5	100.0	84.0
INDUSTRIAL TRADE	79.3	10.9	7.9	1.2	0.7	100.0	84.0
TRANSPORTATION	86.6	8.8	9.1	2.5	0.6	100.0	93.0
COMMERCIAL	93.4	5.2	2.9	0.6	0.6	100.0	93.0
GENERAL	80.0	0.0	0.0	0.0	0.0	100.0	80.0
MISSING INVESTMENT	100.0	0.0	0.0	0.0	0.0	100.0	95.0
NET INVESTMENT	100.0	0.0	0.0	0.0	0.0	100.0	95.0
INVESTMENT	88.4	10.6	20.2	0.8	0.5	100.0	84.0
GENERAL	82.4	4.3	8.2	1.4	0.2	100.0	82.4
GENERAL	74.4	6.5	10.4	1.7	0.1	100.0	65.0
GENERAL	78.8	4.3	12.9	2.0	1.0	100.0	97.0
GENERAL (INVESTMENT)	92.6	4.4	6.0	0.5	0.0	100.0	79.0
GENERAL (INVESTMENT)	92.6	4.4	6.0	0.5	0.0	100.0	79.0
GENERAL	74.9	19.3	3.0	2.4	0.3	100.0	80.2
GENERAL	75.7	13.2	9.0	1.4	0.6	100.0	93.0
GENERAL	75.5	10.4	11.0	3.2	0.9	100.0	90.1
GENERAL	80.0	10.5	6.7	0.9	0.0	100.0	82.3
GENERAL	84.9	10.4	4.7	0.0	0.0	100.0	84.9
GENERAL	79.3	13.6	5.1	0.9	1.0	100.0	84.0

NOV 22 1974

1974/75 FINANCIAL PROJECTION

(in thousands of dollars)

1974/75 Expense Budget	\$ 41,566
Additional salary adjustment required for support staff <u>IF</u> McMaster Hospital salary levels were to be fully matched	<u>1,429</u>
Adjusted Expense Budget	42,995
1974/75 Income	<u>40,319</u>
1974/75 Forecasted Deficit	2,676
Less identified budget reductions	<u>650</u>
1974/75 Anticipated Deficit	2,026
Accumulated surplus on hand at the beginning of 1974/75	<u>1,600</u>
Deficit entering 1975/76 <u>IF</u> Hospital salary levels matched	\$ <u>426</u>

1975/76 BUDGET MODEL

(in thousands of dollars)

1974/75 Adjusted Expense Budget	\$ 42,995
less identified reductions	<u>650</u>
Revised Budget for 1975/76	42,345
1. Cost in May/June of 1 July, 1974	
Salary Increase	550
2. Additional Cost in 1975/76 of Hospital	
Adjustment, if made.	1,051
(excludes personnel on research grants)	
3. Ten Month Cost of 1 July, 1975	
Salary Increase	3,631
4. Increase in Graduate Student Support	450
5. Increase in Library Book Prices	246
6. Price Increases - Supplies and Services	1,075
7. Price Increases - Maintenance	440
8. Portion of Growth Income for additional	
requirements	
(1200 BIUs x 2100 x 25%)	<u>600</u>
1975/76 Total Forecasted Expenses	\$ <u>50,388</u>

November 22, 1974



11/20/74
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P.M.
McMASTER UNIVERSITY LIBRARIES

STATUS OF McMASTER PENSION FUND

Impact of Inflation

The McMaster Contributory Pension Plan was last evaluated on July 1, 1972. In calculating the costs of the Plan at that time it was assumed that the traditional relationships between fund investment earnings and the rate of salary increases would continue (i.e., the rate of fund earnings would be greater than the rate of salary increases). We did, however, predict gloomier days ahead and set the differential between rate of fund earnings and salary increases at a conservative 1.5%.

Consequently, it was anticipated that the fund would earn approximately \$300,000 extra (1.5% x \$20,000,000) each year to help offset future liabilities that arise out of our final earnings type plan. Unfortunately, the fund has been dealt a doubly crushing blow in that inflation and attendant salaries have risen to an unprecedented high rate while investment earnings have fallen steadily over the past two years due to the deterioration of the bond and stock markets in general. As a result, the rates of salary increases have far outstripped investment earnings (e.g., 11% salary increases vs 7.5% fund earnings). This drastic inversion would mean a loss to the fund of approximately \$1,000,000 in 1974-75 alone. This does not include any calculation for the fact that the realizable or market value of the securities is currently far below the book value or cost of these securities.

Under the terms of the Pension Benefits Act of Ontario, the University is responsible for funding this deficit. While such costs are not as visible as others (e.g., salary increases), they have, nonetheless, a very serious long range impact on the University by virtue of the legal requirements surrounding them.

The University has requested its actuaries to conduct a study of the Pension Plan as of July 1, 1974 to more accurately assess the problems of inflation and low fund earnings on both past and future service liabilities.

1975/76 BUDGET MODEL

(in thousands of dollars)

1975/76 Total Forecasted Expenses	\$ 50,388
Less Non-Formula Income	<u>2,408</u>
	47,980
Formula Income	
20,500 BIUs x \$2100	<u>43,050</u>
Potential Deficit for 1975/76	4,930
Accumulated Deficit from 1974/75	<u>426</u>
Total Accumulated Deficit	\$ 5,356

November 22, 1974

CONSEQUENCES OF "WINDING DOWN" RESEARCH

Supplement to McMaster Submission to OCUA

During the meeting that McMaster University had with the Ontario Council on University Affairs, there was general recognition that research and scholarly work have been very strongly encouraged at this University with the result that several of our departments rank very high in their fields on both the national and international scene. At the meeting, we were asked to outline the consequences that continued reductions in the real dollar support for research would have on our programs. Although McMaster spokesmen brought out several important points, much remained unsaid. This essay is a further elaboration of our verbal replies to the question, "what effects would a decision, conscious or unconscious, to 'wind down' research have for programs at McMaster?" It concentrates on research in science, health science and engineering.

Before dealing with the specific question, we wish to note some of the characteristics of the current climate for research and of the general nature of research teams.

The financial support of research in Canada by Federal Granting Agencies is inadequate, to say the least. For several years, costs of doing research have increased much faster than have the budgets of these agencies. At the same time, the Government of Ontario has also reduced its support to Universities. This double squeeze is seriously affecting our capability to get research done, and for the first time since McMaster began to develop scientific research on a large scale 25 years ago, we have been forced to reduce our activities and to contemplate a drastic deterioration such that even our best groups will get so little support that they will be destroyed and their members will look for positions elsewhere.

Lest such statements be thought an exaggeration, it must be recognized that:

- (a) Research gets done because highly creative persons are able to do what seems important to them.
- (b) Especially for the best and most innovative research, the pace is set by international competition and groups that become too small or too poorly equipped to compete will either have to settle for second-rate status in such fields or find less competitive (and often less important and interesting) areas in which to work.
- (c) We are now in imminent danger of being unable to afford enough research assistants to maintain the momentum of our programs.

(d) As the staff-student ratio is forced down because increases in the BIU do not meet inflationary cost increases, faculty find that the time they can devote to research becomes more and more limited. This limitation, combined with the lack of assistants outlined in (c), is making it very difficult for younger faculty members in particular to develop their fullest potential.

(e) Because of the way much of our research equipment has been provided through capital grants at the time new buildings have been occupied and the lack of funds for proper amortization, we are now, as the equipment grows obsolete or wears out, facing a crisis. We cannot at present see how any combination of existing funding sources can meet the need that is developing.

(f) To take advantage of new research opportunities, a multi-disciplined approach is increasingly required. To entice the best scientists into such groups requires a very special climate, especially as the most effective groupings are semi-formal ones which come together, carry out a particular piece of work and then often realign their talents and resources to pursue another worthwhile problem and do not slip into a "research rut". In a climate like the present one in which resources are very limited and granting agencies are "approving" grants that they are unable to fund (as the MRC did in 1974) the adventurousness and the willingness of researchers to embark on new team programs, however worthwhile, is strongly inhibited. Persons are tempted to keep on doing what they have immediate experience with and know will produce a quick payoff in publications.

(g) Flourishing, first-rate research groups are built up over long periods of time. They cannot be created instantaneously! If Ontario lets the research in its Universities deteriorate now, many of the very best people will leave and a later decision to foster research once more will mean that much has to be laboriously rebuilt.

Thus it is starkly clear that research at McMaster and elsewhere in the province is in a precarious state and that "winding down" of our research programs, far from being a remote possibility, has already begun. What will be lost if this continues? The following sections present answers to this question under these headings:

1. Academic losses, i.e., loss of opportunity to maintain and enter research in exciting and important fields.
2. Reduction in the pool of highly trained manpower.
3. Practical and direct losses brought about by the termination of projects which are of direct and immediate benefit to society.

1. Academic Losses

These will be of two sorts. First, the lack of full Ontario (and perhaps Canadian) participation in one of the major cultural pursuits of our time will result in further reliance on others to perform the research which will keep our industries and agriculture competitive and our health care system effective. This subject has had extensive discussion in the past few years (see for example the Science Council of Canada Report No. 18: Policy Objectives for Basic Research in Canada, September 1972). Further, "winding down" research in our Universities will impede the transfer of research results obtained by scientists in other countries to Canadian problems.

The second academic loss will be the result of a lowering of the quality of education for university students, undergraduate as well as graduate. Many of us can recall the state of Canadian Universities (with perhaps two exceptions) in the 1940's and 1950's when the research carried out by most faculty was non-existent or trivial. This lack "fed back" to undergraduate teaching--many of us missed out on hearing about exciting developments because our professors were themselves unaware of what was happening in their fields. Those of us who went on to graduate schools (often outside the country) "caught up" with these ideas and concepts. The situation at McMaster for the past two decades or so has been dramatically different. Our undergraduates do learn from up-to-date and often exciting persons on the forefront of their fields (surely the hallmark of a University as opposed to a High School or Community College). If our research is "wound down" so that some of our best people leave and the remainder are forced to curtail their research activity, it will be very difficult indeed to keep our teaching programs from slipping back to those of an earlier era.

2. Reduction of Manpower

Despite the reports in the press a few years ago, it appears that we are in no danger of producing such a large number of scientists and engineers with graduate degrees that there will be an employment problem. In fact, in engineering at least, all signs point to an imminent shortage brought about largely by the very lucrative jobs available to B.Eng. graduates.

The quality of graduate education is very closely tied to the quality of research being carried out in the group (and department) in which a student works. Thus a "winding down" of our research programs will have a direct effect on our graduate work. Given the fact that the A.C.A.P. evaluations of many of our departments are very good indeed, it would clearly result in a loss of educational opportunity within the Province if these programs were unthinkingly "wound down". We strongly believe that means must be found to maintain graduate programs of the highest possible calibre in Ontario.

3. Direct and Practical Losses to Society

Some areas of academic endeavour contribute directly and immediately to society in an obvious way. Examples are: trials of medical procedures or of new therapeutic agents, practical environmental or planning studies, or applied work on communications technology. Behind this type of work lies a whole series of studies ranging from "practical" to "theoretical". There are directly useful spin-offs (in the sense of knowledge that can be used today) from many of these. The results of sound theoretical studies will surface in years or decades and in ways now unsuspected to help form the basis of new technologies.

The paragraphs that follow outline some of McMaster's research that is immediately useful but which will be threatened if increased resources do not become available and details other areas in which we have recently developed a base that would permit the development of new and important research if resources permitted.

a) Health

Obviously most of the research in Health Sciences has relevance to the understanding of disease and the improvement of therapy. The examples listed below include only those projects which could be expected to have immediate practical results and for which continued support seems doubtful or where logical new developments are being inhibited. It should be realized, however, that even well established areas like immunology and neuroelectrophysiology are receiving less real dollar support this year than they did last year. In other areas such as pharmacology and gastroenterology the growth in funding required to allow faculty who have recently been recruited to develop research programs is not forthcoming.

Specific examples:

(1) Research on the use and effectiveness of nurse-practitioners and other para-medical persons in primary care: Drs. Spitzer and Kergin carried out the first randomized trial to examine the efficiency of the use of nurse-practitioners in physicians' offices. Briefly they have shown that such persons helped to reduce the costs of medical care and that there was a significantly lower rate of admission to hospital of patients who had access to community medical services which involved nurse-practitioners.

Research in the area of provision of health services is difficult and there is a major shortage of competent personnel. The present funding mechanisms make it difficult to provide for full-time careers for faculty in this area. We have had to carry a number of our positions on special grants from National Health and Welfare. When this special support ceases we will have extreme difficulty in maintaining our faculty, even though this is an area of fundamental importance in health sciences education and research in relation to health services. Without centres staffed with competent personnel there will be virtually no training of personnel to carry out the research which is needed in the area of health services.

In addition the present constraints on University funding make it virtually impossible to implement the results of these studies for the education of physicians and nurses in comprehensive primary health care, an issue which is of fundamental importance to the health care system.

(ii) McMaster has established and is taking part in a number of major studies to apply basic knowledge to the diagnosis and management of diseases of the cardiovascular system. These include:

- a) a large multi-centre prospective clinical trial designed to determine how important serum lipids and cholesterol really are influencing the incidence of heart attacks;
- b) the effect of drugs (sulphinpyrazone) in the prevention of thrombosis in arterio-venous shunts used in kidney dialysis;
- c) the effect of drugs (aspirin and sulphinpyrazone) in the prevention of strokes. This is a national study in which McMaster is the centre for the design control and data handling for the study.

These studies require sophisticated support in respect to clinical epidemiology and data analysis. Restriction of University funding makes it very difficult to maintain the faculty personnel to run these programs since the key people are not funded from research grants.

- d) The clinical base that the M.U.M.C. neonatal unit has built up by organizing and applying knowledge obtained elsewhere has resulted in mortality figures which are at least as favourable as those obtained anywhere in the world. This unit is now at the stage where a strong research component should evolve. Lack of funding, however, makes this impossible.
- e) Another area in which lack of resources is making it difficult to develop clinical research is cancer chemotherapy. The centralized chemotherapy program would provide an excellent clinical basis for research of direct benefit to cancer patients.

b) Areas of Science and Engineering which have been given major emphasis and supported by NRC Negotiated Development Grants

In four areas, materials research, communications, isotopic geochemistry, and metalworking, McMaster has been aided by negotiated development grants provided by the NRC. In their original concept, these grants were designed to allow the University to build up strength rapidly for a coherent and well planned program in a given area in which the institution already had considerable strength. Funds for this purpose were provided over a period of three to four years and were meant to be "seed money". Typically such funds were

used to pay the salaries of one or two key new faculty members and to provide technical support, equipment and supplies. It was assumed that financial responsibility for some of these items could be transferred progressively to the University budget or to individual research grants since teaching programs (and hence BIU income) was expected to expand as were grants to faculty for the support of research. Had the financial climate and graduate enrolments that prevailed in the 1960's continued, the concept of negotiated development grants would have been very sound. The NRC has, however, not been able to increase operating grants or to extend negotiated development grants beyond their original term. At the same time BIU income has fallen in unit value and the overall graduate enrolment in the physical sciences and engineering has declined. What is really needed now is continuing support for high class programs. Without such support, we will be unable to sustain the level of activity we have now reached. Two areas in which there are or soon will be difficult problems are:

Materials Research - A group which involves McMaster scientists and engineers (basic and applied) and as well as persons from industry. This group desperately needs "core" support for technical services which are shared by a number of research groups. If such support cannot be found, the result will be a lower level of activity and ultimately the destruction of a large multidisciplinary group which has been judged to be extraordinarily successful by external consultants and which provides an interface with industry.

Communications Technology - a research area which has been selected for special emphasis within the McMaster Department of Electrical Engineering. In particular, we have developed research in satellite communications and microwave and radar technology. In addition to the negotiated grant from NRC, specific projects have been sponsored by industry and by the Federal Government. In this area, graduate enrolment has increased from 8 to 20 in three years and income generated from research contracts is well ahead of that projected. However, the University may be unable to meet its commitment to maintain the number of faculty and technicians now devoted to this work or to continue to provide the necessary equipment once the negotiated development grant is terminated.

c) Other Areas in the Faculty of Science

Most of the faculty members in science are pursuing programs of basic research which aim to increase our understanding of nature. Much of our present technology (industry, communications, agriculture and health) have been made possible by application of the results of such studies. Obviously the "pay off" from basic research is a long term one. However, faculty members who are engaged in basic research acquire expertise which is sought by government and by the private sector and often, almost as by-products of their basic work, find themselves in a position to make contributions which are immediately "practical". In other areas, such as psychology and environmental science, much of the work can be both basic and of immediate value to society. Some examples of both kinds of areas follow.

(i) Environmental Science

- In Biology, two faculty members have close working relations with the Canada Centre for Inland Waters (CCIW) and a member of the CCIW staff holds a part-time appointment in our Biology Department. These individuals have worked together with graduate students to study various aspects of the lakes, Hamilton harbour and Cootes Paradise marsh.

- Another faculty member in Biology is, in collaboration with a micro-climatologist and a soils expert from Geography, studying the plant ecology of Northern Canada. These studies on the destruction of ground cover and its regeneration also have immediate relevance to the biological and physical effects of construction of pipelines at high latitudes.

- A biologist and a member of the Civil Engineering Department have been working with the Hamilton Regional Conservation Authority to try to reduce weed growth and to eliminate "swimmers itch" (caused by a protozoan organism parasitic in ducks and snails) in a popular local artificial lake. This project has also involved several undergraduates who have been hired for the summer.

- A group in Geology is concerned with the definition of chemicals and other materials which pollute the atmosphere and water. These studies have included such areas as material on the bottom of Hamilton Harbour, windborne pollutants emanating from the smelters at Sudbury, the physics and chemistry of lakes of the Canadian Shield and the biological productivity of those lakes and the appearance of asbestos-type material in Lake Superior. Their work clearly has immediate value for pollution abatement and the protection of humans from pollutants.

- A chemistry group is concerned with the development of methods for the desulfurization of natural gas, coke oven gas, and other waste gases from industrial processes. The results of studies at McMaster have already been applied in the design and construction of new industrial plants.

- Another group in chemistry is developing sensitive new procedures for the separation and determination of metal ions and phosphate (a major pollutant) and of carbon monoxide in air. This work has led to interaction with local industry.

With the support of the Ontario Ministry of the environment, a chemistry group works on methods for the determination of trace metals in biological systems. Among other things, this work has shown that neutron activation analysis is far superior to the commonly used procedure for the estimation of mercury in biological samples.

By its very nature the Department of Geography is involved in several aspects of environmental science. (A complete record of the practical contributions of this group for the past ten years would fill many pages. The following sample gives some idea of the scope of their work.)

- Climatology - including studies of airborne pollution in Hamilton, studies on frost protection for the orchard industry of Ontario, calibration of moisture and radiation energy fluxes over crop surfaces in Ontario and more recently and on a larger scale, over the Great Lakes. Fundamental research on climatic energy with standing crops is conducted in collaboration with scientists at the Canada Agricultural Research stations at Simcoe and Elora.

- Hydrology - McMaster scientists are involved in hydrological studies specifically directed at evaluating the hazards that flash floods pose to potential oil and gas pipe lines from northern Ellesmere Island. Coastal ice and problems of docking of large vessels, such as super tankers in these regions have also been examined as has the effect of a new hydro transmission line upon the water quantity and quality of the Beverly Swamp (west of Hamilton).

- Geomorphology - Geomorphologists, through their research on the genesis of beaches and coasts and limestone landforms have been widely consulted by the National Parks Service of Canada and the Ontario Parks Service. In particular, through the work of McMaster scientists, the discovery and analysis of a number of very beautiful natural caverns has been carried out and tourist display facilities for some of them are being developed. These scientists have also contributed to solving problems of domestic and industrial water supply in a variety of countries.

- Remote Sensing - McMaster has been participating in this and new and rapidly developing technology which is designed for resources exploration planning development and control using information returned from high altitude aircraft and the earth resources technology satellite.

- Human Geography - The human geographers at McMaster have been involved with several industries and many community groups. They have contributed to regional urban planning in Hamilton-Wentworth and environs and have published studies on the efficiency of regionalization of services such as hydro and hospitals. Currently the group is involved in extensive studies of transportation corridors in the Golden Horseshoe and with rational distribution of mental health care facilities in large urban areas in the province.

(ii) Chemistry

- Analytical chemistry is an area where practice and theory come close together. The fundamental work on nucleation from solution and on co-precipitation has a direct bearing on our understanding of many natural and synthetic processes of practical interest such as boiler scale formation, crystal formation in oils and syrups, bone and tooth formation and diseases such as arthritis.

- Studies of sulphur isotope chemistry at McMaster University have led to applications of an extremely practical nature. For example, the relative abundances of the sulphur isotopes in the organic sulphur compounds in crude oil reflect the kind of environment in which the oil containing sediments were deposited and in which the oil was generated. A method of finger-printing oil is therefore provided. This means that two or more oils having isotopically similar sulphur are probably of common origin, even though their present day reservoirs may be separated vertically in the sedimentary basin by thousands of feet and horizontally by hundreds of miles. Further, the study of the isotopic composition of sulphur in related sedimentary rocks makes it possible to identify with greater certainty the actual strata in which an oil was formed before its subsequent migration to its present day reservoir.

The use of these techniques in oil exploration would not have been possible without an understanding of the physical, chemical and microbiological processes, which alter sulphur isotope abundance patterns, and without a widespread survey of isotope distribution patterns in nature.

Sulphur isotope chemistry is now also being applied to the solution of environmental and pollution problems.

- Nuclear data gathered at McMaster University by chemists and physicists over the past 25 years involving neutron cross sections, half-lives of atomic nuclei and yields of fission products has been of a fundamental nature and necessary to the design and operation of nuclear reactors. This on-going program provides additional technical back-up of special mass spectrometer techniques of high sensitivity for isotope abundance measurements at McMaster which made this whole nuclear data program possible.

- "Superacid" solutions were first prepared and studied at McMaster some ten years ago. These systems are the strongest known protonating agents and are very useful for the preparation of stable solutions of carbonium ions. They are being used in the petroleum industry at the moment as isomerisation catalysts in the production of better quality non-leaded gasoline.

- In the area of physical chemistry, studies on the photolysis of halogenated aliphatic compounds which were carried out for their intrinsic scientific interest are clearly now of relevance to a practical environmental problem.

- Research in organic chemistry has not been consciously directed to practical problems. Nevertheless, in the course of other studies, a simple and efficient method for the deuteration of organic compounds has been developed for which a patent application is being processed. The production of deuterated aromatics on a relatively large scale by this process is being carried out by Merck Sharpe and Dohme in Montreal. This work promises to be an effective method for labelling drugs and other substances for use in drug metabolism studies.

In addition to these projects which have immediate and obvious practical benefits, much of the remaining work in areas such as chemistry has potential practical advantages. Indeed some of the fundamental studies in progress may well be more important in the long run than the practical work that research groups are now doing. The following examples illustrate the point:

- Current work with carbonium ions bears directly on the processes currently used in the petrochemical industry for the manufacture of high octane fuels.

- All members of the organic group are continuously synthesizing new compounds of potential pharmaceutical importance. The establishment of a testing centre in Canada financed by CPDL will enable us for the first time to have our samples screened for biological activity. As a specific example, a faculty member is currently developing general methods of synthesis of macrolide antibiotics of the erythromycin type. The successful completion of this project will enable chemists to modify the present structures and test the modified products for their biological activity.

- Recently one of the theoretical chemists has become interested in the relationship between pharmacological activity and the potential field about biologically active molecules. The two factors appear to be directly related. This work has highly practical implications in the design and study of new pharmaceuticals.

(iii) Physics

McMaster's nuclear physics program has for the most part concentrated on basic research. As noted above, some of the results of this work have provided data required to develop the nuclear power industry. Another aspect of the program which has produced results of immediate practical value is the development of extremely sensitive instruments and computer technology for detection of neutrons and gamma rays. The existence of this equipment has made it possible to solve a wide range of practical problems such as the location of embolisms in the lung, measurement of absolute bone density in living subjects and the analysis of wood from trees near a steel plant to determine how the levels of smoke pollution have varied during the past 40 years.

Graduate students who have been involved in any aspect of this work are eagerly sought after by employers.

(iv) Psychology

- The sociological, personality and motivational factors that enter into the decision to become a Canadian citizen are being examined. It turns out that on the average, it takes a landed immigrant 12 years to become a citizen. "Why so long?" is the question for which an answer is sought.

- An interdisciplinary research group concerned with understanding the short and long term effects of the habitual use of marijuana includes psychiatrists, pharmacologists and other members of the Health Science Faculty at McMaster and is taking a unique approach to a serious problem.

- A faculty member is working on the development of visual pattern perception in infants. Her laboratory is in the Health Science Complex and the potential significance of her work for early diagnosis and treatment of visual defects is clear and exciting. Again, her approach to the problem is unique. It is in no way redundant with, for example, the work of ophthalmologists.

- Another research group is working collaboratively with the Department of Psychiatry on the problem of schizophrenia which affects 1% of the general population and is the most common form of all incapacitating mental illnesses. Approximately 20% of first admissions to psychiatric services are diagnosed schizophrenic and because the disorder often requires lengthy hospitalization, schizophrenics constitute about half of the patients in these facilities. In spite of intensive efforts for many decades there is no known cure for the disorder. Taking the point of view that prevention of schizophrenia will be the best resolution to the problems posed by schizophrenia, this group is studying the developmental precursors of schizophrenia. On the average, 10% to 15% of the children of schizophrenics will grow up to be schizophrenic. These "high risk" children will be the target for intensive, longitudinal investigations. Observations made on these children may permit detection of early signs of maladjustment. If early detection is possible, then early intervention may deflect the development of these disturbed high-risk children away from a life-long course of maladjustment.

These interdisciplinary ventures require a good deal of faculty time since in the initial stages a group of key persons must find and bring together the range of skills required for the program. If the pressures of undergraduate teaching continue to grow, such adventurous research will be badly inhibited.

d) Engineering

In engineering as in medicine, a great deal of the research is directed toward practical objectives. A complete listing of these would run to many pages. The five examples given below give some idea of the kinds of activities and the problems that we see in trying to maintain some of them.

- A major area of emphasis in the Department of Chemical Engineering is computer simulation and control of industrial processes. This field has evolved very rapidly in the last five years. Masters and Doctoral graduates trained in this area are in much demand and there is no shortage of strong applicants for graduate work. However, budgetary restrictions have slowed our progress and we are not able to expand our facilities to take on more students.

- A similar situation is inhibiting expansion of our programs in nuclear engineering. For the past four years we have pursued an active M.Eng. program in this area using as a teaching and research tool the McMaster reactor. We are, however, unable to accommodate all well-qualified applicants and thus cannot begin to meet the demands of the power industries. There is a need for doctoral work in this area too, but the requisite resources for new staff and instruments are lacking.

- In the Department of Metallurgy and Materials Science, many of the projects are of importance to industry. Research carried out with one of the steel companies has led to improved processes for the production of pipeline steel. In this process, the steel is rolled at relatively low temperatures to control the precipitation of carbides and thus increase the strength of the product. Another faculty member has devised a mathematical procedure for predicting the hardenability of steel from a knowledge of its elemental composition. This procedure permits steel-makers to take advantage of the trace elements present (often as a consequence of the re-use of scrap steel!)

- Other work has concerned the oxide and sulfide layers which can be formed on nickel alloys to improve corrosion resistance of jet engine and other components.

- The research activities of the Department of Metallurgy and Materials Science received high praise in the recent ACAP assessment. It was, however, suggested that an additional faculty member in the area of extractive metallurgy was required. Budgetary limitations have prevented us from making this appointment.

January 2, 1975

